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with violence from April to October, gives fair weather and leads the European residents to occupy the eastern coast of the island. From November to April the wind is light and variable with not infrequent calms; rains are then heavy and the high humidity makes the weather next to unbearable.

The Horne Islands are about 250 km. nearer Fiji; but as they are in east longitude from Paris, while Wallis is in west longitude, their dates differ by a day. Here are two volcanic islands; Fotuna, 40 km. in circuit and 850 m. in height, and Alofi, 20 km. in circuit and 200 m. in height. Both are singularly unlike Wallis in having strong slopes, rich forests that shade deep ravines drained by fine streams, only discontinuous fringing reefs instead of an encircling barrier reef, and therefore no good harbors. Viala describes these islands as "two pyramids, of which the flanks plunge into the sea in abrupt cliffs" (*falaises*); but the last term can hardly be correct, for the views of the islands on Hydrographic Office chart 1986 show the slopes to descend with almost even declivity from summit to shore. It may be added that neither the chart nor Viala's description suffices to determine whether the deep ravines lead down to embayments in the shore line or not; also, that in view of the presence of a number of submarine banks or "drowned atolls" in the north—a region without rival in this respect in the whole Pacific and for which the reviewer has therefore proposed the name "Darwin Hermatopelago" (*Bull. Geol. Soc. Amer.*, Vol. XXIX [1918], p. 531)—it is likely that the absence of a barrier reef here is to be explained by recent submergence at a rate too fast for reef upgrowth: hence whatever barrier had been formed around the two islands previous to this submergence should exist now as a submarine bench. The lack of soundings makes it impossible to test this supposition.

Viala gives interesting accounts of the natives, of whom there are 4,500 on Wallis and 1,500 on Fotuna and Alofi, with descriptions of their various customs, of the Catholic missions by which their mode of living has been much improved, and of the prevalent diseases. A noteworthy peculiarity of the natives is their boldness in risking inter-island voyages in their canoes, with only the rudest means of laying their course.

W. M. D.

The Reed-Wekusko Map-Area, Northern Manitoba. By F. J. ALCOCK. Ottawa: Canadian Geological Survey, Memoir 119, 1920. Pp. 47, pls. 6, maps 2.

The discovery of gold-bearing quartz veins and rich sulphide deposits in basic pre-Cambrian rocks of northern Manitoba has attracted con-

siderable attention. This memoir describes in some detail one of these areas of basic pre-Cambrian rocks and is representative of the geology of the mining camps of northern Manitoba.

The area lies along the border of the Laurentian Plateau to the north and the Great Plains to the west. The average elevation of the Laurentian Plateau part is about 950 feet above sea-level, the highest hill being 1,060 feet and the lowest flat 818 feet above sea-level. This hummocky surface of low relief represents the surface of a pre-Ordovician peneplain recently uncovered and slightly modified by Pleistocene glaciation. The streams are characterized by lake expansions, rapids, and waterfalls. Lakes with irregular outlines and many islands are abundant.

The rocks fall into four groups: (1) Pleistocene drift and stratified clay; (2) Ordovician dolomite; (3) pre-Cambrian granite and its differentiates; and (4) pregranitic complex of igneous and sedimentary rocks.

The Pleistocene deposits consist of drift, outwash material, and stratified clays deposited in glacial Lake Agassiz. The Ordovician dolomite forms an irregular escarpment across the southern border of the area. No clastic base is present and the Ordovician seas advanced over a slightly rolling surface. A few fossils of Trenton age have been found in this dolomite. The pre-Cambrian granites, the most abundant rocks of the area, are intruded as stocks and batholiths and vary considerably from place to place in both mineralogical and chemical composition. Massive reddish biotite or hornblende-biotite-granite is the most abundant type. In general these granites are massive, but in places gneissoid types occur. Pegmatite dikes and quartz veins represent the last phases of the intrusion. The pregranitic complex, the oldest rocks of the region, is divided into the Kiski volcanics and the Wekusko sedimentary series. The Kiski consists largely of volcanic rocks varying in composition from rhyolite to basalt. Beds of pyroclastics are found interbedded with the flows. These rocks are altered to sericite, hornblende, biotite, and chlorite schists. The sedimentary division or Wekusko series consists chiefly of garnet gneiss and mica schist with many other varieties of metamorphic sediments in smaller amounts. The series is of great thickness, is highly folded, and intensely metamorphosed. Except for a small area of slate, the series is coarse clastics which vary considerably in coarseness from place to place and with local conglomerate horizons.

The chief ore deposits of the region are gold-bearing quartz veins associated with the granite intrusives and cutting all pre-Cambrian

rocks of the region. These quartz veins are abundant along the contacts of the granite and the Wekuspo series. Some of the quartz contains gold in visible quantities. The veins are variable in width averaging from 18 inches to 12 feet and some of them have been traced for 1,600 feet or more. One carload of ore shipped from the Northern Manitoba group averaged \$81.53 per ton in gold. Considerable development work on a number of the properties has already been done, and after transportation facilities are improved and mining conditions become normal, this should prove an important gold-producing region.

J. F. W.